REMARKS

Reconsideration and allowance of the present application are respectfully requested.

Claim 15 has been amended to correct a typographical error and to recite a siloxane polymer. Claim 16 has been canceled. No new matter is added.

Restriction Requirement

Claims in Groups I, II and III identified by the Patent Office are directed to immersion liquids and their use in photolithography processes. The provisional election of Group III during the call on December 6, 2006 was made by Applicants with traverse because the above stated commonality exists among the claims in Groups I, II and III and, as such, no substantial burden is involved in the examination of all claims in a single application.

In a decision dated June 23, 1977, on a petition filed June 13, 1977, Group 1210 Director Alfred L. Leavitt in granting the petition to withdraw the requirement for restriction said:

> Current Office policy is not to require restriction between related inventions when no substantial burden is involved in the examination of all claims in a single application.

And in a decision dated December 3, 1993, on a petition filed March 12, 1993, Group 1100 Deputy Director John Doyle said:

> Restriction was required between (I)method for epitaxial deposition and (II) epitaxially deposited product (Paper No. 4). However, the examiner failed to present any convincing basis for the holding that the inventions as above grouped are distinct. The claimed inventions must be independent or distinct, and the examiner "must provide reasons and/or examples to

> support conclusions . . .". Further, the field of search for the alleged distinct inventions is seen to be coextensive, hence, no serious burden is seen to be incurred by examination of all pending claims. MPEP 803 under "Criteria For Restriction Between Patentably Distinct Inventions".
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> The Petition is GRANTED.

In this application, all pending claims recite immersion liquids and such immersion liquids are used in photolithography processes. Manifestly, search and examination of all pending claims can be made without serious burden. Accordingly, it is respectfully requested that the requirement for restriction be withdrawn. If the requirement for restriction is repeated, the Examiner is respectfully requested to explain why all the claims cannot be examined without serious burden.

Rejections based on Switkes

Claim 15 stands rejected under 35 USC 102(e) as being anticipated over Switkes, and Claims 16-18 stand rejected under 35 USC 103(a) as being obvious over Switkes. Claims 15 and 18 as amended are patentable over Switkes and the rejections must be withdrawn.

Immersion liquids are used in photolithographic processes to increase the numerical aperture (NA) of the imaging system and to reduce the pitch size of the projected images on the photoresist. In this regard, Paragraph [0005] of the present application provides

> Immersion lithography systems achieve a large numerical aperture by filling the air space between the optical imaging system and the photoresist layer with an immersion liquid having a refractive index of n. Hence, light from the

> imaging system transmits through the immersion liquid to reach the photoresist. The use of the immersion liquid increases the NA by a factor of n in comparison with the NA of the same system without the immersion liquid.

Notably, the use of the immersion liquid increases the NA by a factor of n which is the refractive index of the immersion liquid used. Therefore, a large refractive index is an important material parameter for the immersion liquid. However, searching for the proper immersion liquid with a large refractive index is difficult in part because other material properties of the immersion liquid must be considered due to the interfacing of the immersion liquid with the photoresist layer and the optical lens that are in direct contact with the immersion liquid.

PFPE is a commonly used material for the immersion lithography due to its overall satisfactory properties. However, PFPE materials have a relatively low index of about 1.28 to 1.3 and under 1.4. This aspect of the PFPE compromises its optical performance as an immersion liquid.

A siloxane polymer recited in Claim 15, however, is a superior material for immersion lithography. Referring to the present specification from paragraphs [0018] to [0020]:

> For example, certain siloxane polymers may be used as the immersion liquid 150. Such a polymer or olegomer is a liquid at room temperature when the molecular weight is relatively low. The friction of silicon to wafer is minimum due to extremely low surface energy. Viscosity and surface energy are tunable to meet the immersion requirements by tailoring the polymer structure. After exposure, the remaining material on the resist surface is emulsified or dissolved in water base developer and can be completely removed after wet etch.

> As a specific example of the siloxane polymers, polydimethylsiloxane (PDMS) may be used as the immersion liquid 150. The structure of PDMS is [-Si(CH3)2-O-Si(CH3)2-O-]x where x is a positive integer for the number of the basic unit expressed in []. The glass transition temperature of this PMDS is about -125 °C and thus is well below the normal operating temperature. The refractive index n of the PDMS is large and is in the range of from about 1.4 to about 1.5.
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> Another specific example of the siloxane polymers for implementing the immersion liquid 150 is a block polymer based on PDMS:
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> PDMS-block-Poly(tButoxyl Acrylate)x
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> where PDMS is modified into a block polymer which is water soluble after exposure. The number x may be less than 10, e.g., approximately in a range from 3 to 5. The glass transition temperature Tg and the refractive index n remain essentially the same as PDMS.

Therefore, siloxane polymers can be used to achieve, among other properties, a large refractive index n in the range of from about 1.4 to about 1.5. This aspect of siloxane polymers can be used to achieve smaller feature sizes in immersion lithography than using PFPE.

Therefore, Claims 15 and 17-18 are distinctly different from PFPE based immersion lithography disclosed by Switkes. As such, Claims 15 and 17-18 are novel and are non-obvious. Under 35 USC 102(e) and 103(a), Claims 15 and 17-18 are patentable over Switkes.

This response is filed timely with an extension of time for two months. Please apply the $450 fee for the extension of

time and any outstanding charges or credits to Deposit Account No. 06-1050.

Respectfully submitted,

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